

Application Number 09/577,529
Response to Office Action mailed April 22, 2005

REMARKS

This Amendment is responsive to the Office Action mailed April 22, 2005. Claims 1-56 and 59-68 are pending in the present application.

Information Disclosure Statement

As a preliminary matter, Applicant advises the Examiner that a Supplemental Information Disclosure Statement was filed April 8, 2005. The Supplemental Information Disclosure Statement was filed before a first Office Action following the filing of a Request for Continued Examination (RCE). Applicant did not receive an initialed copy of the 1449 form with the Office Action, and requests that the Examiner forward such copy with the next communication.

Allowable Subject Matter

In the Office Action, the Examiner indicated that claims 10, 18, 29, 36, 47, 55 and 68 would be allowable if rewritten in independent form.

Claim Rejection Under 35 U.S.C. § 103

The Examiner rejected claims 1-9, 11-17, 19-28, 30-35, 37-46, 48-54, 56, and 59-67 under 35 U.S.C. § 103(a) as being unpatentable over Stokes (USPN 5,611,030). Applicant respectfully traverses the rejection. Stokes fails to disclose or suggest the inventions defined by Applicant's pending claims, and provides no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

Stokes provides no teaching that would have suggested constraining destination device-dependent coordinates produced by a multi-dimensional color transformation to prevent removal of selected colorants specified by source device-dependent coordinates, as required by amended claims 1-9, 11, 12, 20-28, 30, 38-46, 48, and 49.

In addition, Stokes fails to disclose or suggest constraining destination device-dependent coordinates produced by a multi-dimensional color transformation to prevent introduction of selected colorants not specified by source device-dependent coordinates, as set forth in amended claims 13-17, 19, 31-35, 37, 50-54 and 56.

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Stokes also lacks any suggestion of a method for multi-dimensional color transformation comprising constraining destination device-dependent coordinates to a range of matching destination coordinates searched by the multi-dimensional color transformation to prevent substitution for colorants specified by the source device-dependent coordinates, as required by claims 59-68.

Stokes does not suggest the application of constraints to destination device-dependent coordinates produced by a multi-dimensional color transformation. Instead, Stokes is directed to gamut mapping techniques that are applied when a destination device is incapable of producing a color specified by a set of source device-dependent coordinates. Moreover, Stokes makes no mention of constraints that prevent removal of or substitution for selected colorants specified by source device-dependent coordinates, nor introduction of selected colorants not specified by source device-dependent coordinates. Stokes is concerned with color names assigned to colors produced by a combination of colorants, and not the individual colorants themselves.

The Stokes reference is directed to a gamut mapping technique that is applied when there is a gamut mismatch between a destination device and a source device. An out-of-gamut condition occurs when it is not possible to produce a set of destination device-dependent coordinates that provides a colorimetric match to a corresponding set of source device-dependent coordinates. In this case, the source device-dependent coordinates define an out-of-gamut color that cannot be reproduced by the destination device. The color is produced by a combination of device colorants, such as CMYK. The colorants are specified by device-dependent coordinates.

When there is an out-of-gamut condition, as described by Stokes, a gamut mapping technique such as clipping or compression must be applied to select an in-gamut set of destination device-dependent coordinates. The in-gamut set of coordinates are substituted for the set of coordinates that does not fall within the gamut of the destination device. Ideally, the selected in-gamut destination device-dependent coordinates will visually approximate the out-of-gamut source device-dependent coordinates. Stokes indicates, however, that the results of clipping or compression-based gamut mapping may be visually unsatisfactory.

Stokes describes a technique to ensure that the out-of-gamut source color and the in-gamut destination color reside within the same general color category from the psychophysical perspective of a viewer. According to Stokes, the out-of-gamut color in the source device and

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the in-gamut color in the destination device are labeled with color names. The color names are assigned to the colors based on psychophysical experimentation indicating what an average user is likely to call the color in question. If the color names assigned to the out-of-gamut and in-gamut colors are different, the out-of-gamut color is remapped to a different in-gamut color. In this manner, Stokes provides a gamut mapping technique that is intended to provide more subjectively pleasing visual results.

Matching sets of device-dependent coordinates to broad color name categories, such as white, gray, black, blue, green, yellow, orange, brown, red, pink and purple, is not even remotely similar to constraining destination device-dependent coordinates searched by a multi-dimensional transformation, as claimed. If the color name for a set of destination coordinates does not match the name for a set of source coordinates, Stokes selects another set of destination coordinates with the correct name. There is no mention in Stokes of the prevention of removal of or substitution for selected colorants specified by source device-dependent coordinates, nor introduction of selected colorants not specified by source device-dependent coordinates.

The color names in Stokes refer to the overall visually integrated color observed by the human eye, and not particular colorants that are physically combined by a device to form such a color. In other words, the claimed invention is concerned with the particular colorants applied by a device to form a given color, whereas Stokes is merely concerned with the resulting color formed by any suitable combination of colorants. In this sense, Stokes addresses a completely different objective. In particular, Stokes has no regard for the individual colorants that are applied to form a color, provided that the colorants, when combined, produce a color within an acceptable color name category.

As explained in previous responses, a multi-dimensional transformation may produce several sets of destination device-dependent coordinates that provide a colorimetric match with a set of source device-dependent coordinates. In accordance with the claimed invention, however, one or more constraints ensure selection of a set of destination device-dependent coordinates that prevents removal of or substitution for selected colorants specified by source device-dependent coordinates, nor introduction of selected colorants not specified by source device-dependent coordinates. Again, the colorants specified by the source device-dependent coordinates are device colorants, such as CMYK, that are combined to produce a color.

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Different combinations of device colorants can be used to produce substantially the same color. In many cases, however, it may be desirable to ensure that selected colorants are used. For example, it may be desirable that a black (K) colorant is used, instead of combinations of cyan (C), magenta (M) and yellow (Y) colorants that produce an equivalent black. By constraining the destination device-dependent coordinates, the claimed invention promotes colorant integrity between the source and destination devices for selected colorants. For example, the claimed invention may ensure that a particular colorant used by the source device is also used by the destination device, rather than being replaced by a different colorant or combination of colorants.

Stokes makes no mention of the application of a constraint to destination device coordinates produced by a multi-dimensional transformation, as defined in Applicant's claims. Nor does Stokes discuss a desire to prevent removal of or substitution for selected colorants specified by source device-dependent coordinates, or introduction of selected colorants not specified by source device-dependent coordinates. Indeed, Stokes is not concerned with the individual colorants used to form a color, but rather the overall color.

In support of the rejection under section 103, the Examiner characterized Stokes as disclosing a multi-dimensional color transformation in which destination device coordinates are constrained "for having a same color with the source device coordinates." The Examiner stated that Stokes does not teach constraining destination device coordinates to prevent removal or introduction of color image data not present in the source image. However, the Examiner noted that Stokes teaches a "mapping routine whereby an out-of-gamut color A (selected color image data in the source image) is mapped to an in-gamut color A' (selected color image data present in the destination image)," and a determination of whether color names associated with the out-of-gamut and in-gamut colors match.

The Examiner further noted that, in Stokes, when color names do not match, the mapping is modified to prevent a color name boundary violation. The Examiner asserted that a "first mapping constrain [sic] for determining whether the color names A and A' are the same name is equivalent to the step of constraining the multi-dimensional color transformation to prevent removal of selected color image data present in the source image." The Examiner further asserted that a "second mapping constrain [sic] for modifying the mapping routine when the

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color names A and A' are different is equivalent to the step of constraining the multi-dimensional color transformation to prevent introduction of selected color image data not present in the source image."

The Examiner's analysis is incorrect. First, the Examiner has not addressed the actual limitations set forth in Applicant's claims. The claims require constraining destination-device coordinates produced by the multi-dimensional transformation to prevent removal of or substitution for selected colorants specified by source device-dependent coordinates, or introduction of selected colorants not specified by source device-dependent coordinates. As noted previously, Stokes makes no mention of the individual colorants used to form colors, and is merely concerned with color names assigned to colors produced by sets of coordinates. Therefore, Stokes fails to suggest the requirements of Applicant's claimed invention.

Second, the Examiner's characterization of the Stokes reference is mistaken. A determination of whether color names A and A' are the same is not a constraint applied to device-dependent color coordinates produced by a multi-dimensional transformation. In addition, the color names used to make the determination bear no relationship to individual colorants specified by source device-dependent coordinates.

The claimed invention applies a constraint to ensure that selected colorants used by a source device to form a color are also used by the destination device to form the same color. Stokes, in contrast, applies no such constraint, and merely requires that an out-of-gamut color have the same general color name (e.g., white, gray, black, blue, green, yellow, orange, brown, red, pink and purple) as an in-gamut color to which it is mapped. Moreover, Stokes is only concerned with the color per se, and not the individual colorants used to form the color.

Third, the Examiner acknowledged that Stokes "does not directly teach the constraining [of] device-dependent coordinates." The Examiner recognized that Stokes operates within a device-independent color space, but asserted that it would have been obvious to apply constraints to device-dependent coordinates. In accordance with the claimed invention, application of the constraint to the destination device-dependent coordinates permits the multi-dimensional transformation to prevent removal, introduction or substitution of selected colorants. As Stokes is not concerned with individual colorants, one of ordinary skill in the art would have found no

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teaching in Stokes or elsewhere that would have suggested application of a constraint to destination device-dependent coordinates.

The Examiner reasoned that one of ordinary skill in the art would have constrained destination device-dependent coordinates "since the color names are the same while each source or destination coordinate has an equivalent $L^*a^*b^*$ value." Applicant is confused by this statement. The $L^*a^*b^*$ values considered in a device-independent color space do not indicate any particular device-dependent coordinates. Consequently, the device-independent color space used by Stokes does not specify any selected device colorants. At the same time, in Stokes, the color names do not refer to device colorants, but rather overall colors formed by a combination of colorants. Therefore, the motivation identified by the Examiner is erroneous, and would not have guided one of ordinary skill in the art to modify Stokes to conform to the requirements of the claimed invention.

For purposes of brevity and focus, and in view of the fundamental shortcomings of the Stokes reference discussed above, Applicant has at this time withheld further comments concerning the features set forth in the dependent claims. In focusing on the requirements of the independent claims, Applicant neither admits nor acquiesces in the propriety of the rejections applied against the dependent claims. Applicant reserves the right to further address other features of the independent or dependent claims in any future communications.

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CONCLUSION

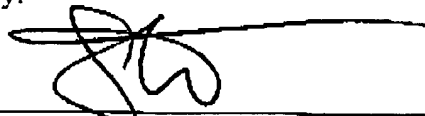
All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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7-22-05

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